

1 Claims

- 2 1. Method for the operation of a battery sensor (1),
3 comprising an ammeter to determine the current in the
4 battery, an evaluation unit (3) and a microprocessor (4),
5 wherein,
6 during an idle phase (RP), in which main electrical
7 consumers (8, 10, 12) that are assigned to a battery (2)
8 are switched off,
9 - the microprocessor (4) is directed into a switched-off
10 state,
11 - at given first time intervals (TA1), the test signal
12 from the ammeter for a given first time duration (TD1) is
13 determined by the evaluation unit (3) and first current
14 values (I_W1) are assigned thereto, the values being
15 monitored in the evaluation unit to check whether a first
16 threshold current (I_THD1) has been exceeded and/or
17 whether a second threshold current (I_THD2) has been
18 undershot,
19 - when the threshold current values (I_THD1, I_THD2) have
20 been exceeded or undershot, the microprocessor (4) is
21 moved into a switched-on state and for a given second time
22 duration (TD2), the test signal from the ammeter is
23 determined by the evaluation unit (3) and second current
24 values (I_W2) are assigned thereto, the values then being
25 evaluated in the microprocessor (4),
26 - given procedures for maintaining the electric charge in
27 the battery (2) are initiated by the microprocessor (4) if
28 a given condition is met, said condition depending on the
29 second current values (I_W2) and
30 - the first time duration (TD1) being shorter than the
31 second time duration (TD2).

- 32
33 2. Method according to claim 1, wherein

during the idle phase (RP), the microprocessor (4) is moved into the switched-on state in given second time intervals (TA2) and for the second given time duration (TD2), the test signal from the ammeter is determined in the evaluation unit (3) and second current values (I_W2) are assigned thereto, the values then being evaluated in the microprocessor (4), the second time intervals (TA2) being greater than the first time intervals (TA1).

3. Method according to any of the preceding claims, wherein an integral for the current over the time duration of the idle phase (RP) is determined as a function of the respective second current values (I_W2).

4. Method according to claim 1, wherein a wake-up signal (S_WU) is generated for a superordinate control unit (6), which is able to implement procedures to maintain the charge in the battery (2) if the integral for the current exceeds a given integral threshold (I_I_THD).

5. Method according to any of the preceding claims, wherein the battery sensor (1) comprises a voltage divider which, on the input side, is supplied with the voltage discharged on the battery (2), and on the output side, is conductively connected to an input (20) on the evaluation unit (3), a first switch (18) being arranged electrically in series with the voltage divider. In one switch position, the aforementioned switch shuts off the flow of current through the voltage divider and, in another switch position, it enables the flow of current through the voltage divider, the first switch (18) being directed during the idle phase (RP) into the switch position in which it shuts off the flow of current through the voltage divider.

1
2 6. Method according to claim 5, wherein

3 a low power resistor is arranged electrically in parallel
4 with the voltage divider, electrically in series to which
5 a second switch (30) is arranged, which in one switch
6 position shuts off a flow of current through the low power
7 resistor and, in another switch position, enables the flow
8 of current through the low power resistor, wherein

9 - the second switch (30) is directed into the switch
10 position in which it shuts off the flow of current through
11 the voltage divider and the voltage on the output side of
12 the voltage divider is determined as the first voltage
13 value (U_{W1}),

14 - the second switch (30) is directed into the switch
15 position in which it enables the flow of current through
16 the voltage divider and the voltage on the output side of
17 the voltage divider is determined as a second voltage
18 value (U_{W2}) and

19 - as a function of the first and the second voltage
20 values, a line resistance (R_L) of an electrically
21 conductive connection is determined between the battery
22 and the voltage divider.

23
24 7. Method according to any of the preceding claims, wherein
25 the battery comprises at least a first and a second
26 battery (2a, 2b), which are electrically arranged in
27 series and the battery sensor has a voltmeter, the
28 measuring signal of which is characteristic of the voltage
29 discharged either on the first or the second battery,
30 measurement values on the voltmeter being determined at
31 given third time intervals ($TA3$) and measurement values
32 for the output voltage of the voltage divider being
33 determined at given fourth time intervals ($TA4$). The third

1 time intervals (TA3) are greater than the fourth time
2 intervals (TA4).

3
4 8. Method according to any of the preceding claims, wherein
5 a generator (34) is assigned to the battery (2)
6 electrically in parallel therewith and a further voltmeter
7 is provided in the battery sensor (1), the measuring
8 signal of which is characteristic of the voltage
9 discharged on the generator (34), measured values from the
10 further voltmeter being determined at given fifth time
11 intervals (TA5) and measured values for the output voltage
12 of the voltage divider being determined at given fourth
13 time intervals (TA4). The fifth time intervals (TA5) are
14 greater than the fourth time intervals (TA4).

15
16 9. Method according to any of the preceding claims, wherein
17 when the voltage drops below a given threshold voltage
18 (U_THD), given operating parameters of the battery (2) are
19 determined and stored in a non-volatile manner.

20
21 10. Battery sensor, comprising an ammeter to determine the
22 current in the battery, an evaluation unit (3) and a
23 microprocessor (4) and which is designed so that, during
24 an idle phase (RP) in which main electrical consumers (8,
25 10, 12) assigned to a battery (2) are switched off,
26 - the microprocessor (4) is directed into a switched-
27 off state,
28 - at given first time intervals (TA1), the test signal
29 from the ammeter for a given first time duration
30 (TD1) is determined by the evaluation unit (3) and
31 first current values (I_W1) are assigned thereto, the
32 values being monitored in the evaluation unit to
33 check whether a first threshold current value
34 (I_THD1) has been exceeded and/or whether the current

- 1 has dropped below a second threshold current value
2 (I_THD2),
3 - when the current has exceeded or dropped below the
4 threshold current values (I_THD1, I_THD2), the
5 microprocessor (4) is moved into a switched-on state
6 and for a given second time duration (TD2), the test
7 signal from the ammeter is determined by the
8 evaluation unit (3) and second current values (I_W2)
9 are assigned thereto, the values then being evaluated
10 in the microprocessor (4),
11 - given procedures for maintaining the electric charge
12 in the battery (2) are initiated by the
13 microprocessor (4) if a given condition is met, said
14 condition depending on the second current values
15 (I_W2) and
16 - the first time duration being shorter than the second
17 time duration (TD2).

18
19 11. Battery sensor according to claim 10, comprising
20 a voltage divider which, on the input side, is supplied
21 with the voltage discharged on the battery (2), and on
22 the output side, is conductively connected to an input
23 (20) on the evaluation unit (3), a first switch (18)
24 being arranged electrically in series with the voltage
25 divider. In one switch position, the aforementioned
26 switch shuts off the flow of current through the voltage
27 divider and in another switch position it enables the
28 flow of current through the voltage divider.

29
30 12. Battery sensor according to claim 11, wherein
31 a low power resistor is arranged electrically in parallel
32 with the voltage divider, electrically in series to which
33 a second switch (30) is arranged, which in one switch
34 position, shuts off a flow of current through the low

1 power resistor and, in another switch position, enables
2 the flow of current through the low power resistor.

3
4 13. Battery sensor according to any of the preceding claims,
5 wherein
6 the battery (2) comprises at least a first and a second
7 battery (2a, 2b), which are electrically arranged in
8 series and a voltmeter (40) to determine the voltage
9 discharged either on the first or second battery (2a, 2b).

10
11 14. Battery sensor according to any of the preceding claims,
12 wherein
13 a generator (34) is assigned to the battery electrically
14 in parallel therewith and a further voltmeter (36) is
15 provided to determine the voltage discharged on the
16 generator (34).